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Regards,

Lu Ren
March 10, 2009

Production of Alginate Beads

A project report presented in partial fulfillment of the requirements for the degree of Master in Food Technology at Massey University, Auckland, New Zealand

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ABSTRACT

This paper was to improve the production of calcium-induced alginate gels manufactured by a company in Auckland. Problems encountered included yield and syneresis of the beads post-gelation. Essentially the alginate, sugars and other ingredients were dissolved in water at 80ºC. The pH of the solution was adjusted and the alginate beads were extruded into a 5% $CaCl_2$ bath before being drained and dried.

The chemical reaction between sodium alginate and calcium ions is dependent upon the solubility and availability of calcium ions. Some calcium salts (e.g., $CaCl_2$, calcium lactate) were readily soluble and fully dissociated in water and resulted in an immediate gelation of the alginate. Dicalcium phosphate (DCP) was sparingly soluble at pH 7 and calcium ions were not released significantly until the pH reached about pH 4.2. Sodium hexametaphosphate (SHMP) is a chelating agent and this was used to soak up small quantities of Ca^{+2} to ensure no gelation occured while the alginate was being mixed. The optimum quantities of alginate, DCP and SHMP were defined in the laboratory trials.

The use of SHMP, maltodextrin, and gums significantly affected the hardness and stickiness of gel beads. It was found that the combination of xanthan and alginate Protanal LF 120 gave the best results in terms of minimal stickiness and maximum yield after drying.

Key words: alginate gel beads, syneresis, formula, pH, citric acid, gelation time, SHMP, setting time, yield rate, drying, hardness, stickiness, maltodextrin, xanthan gum, guar gum, stickiness by touching, leakage, apparent viscosity.

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